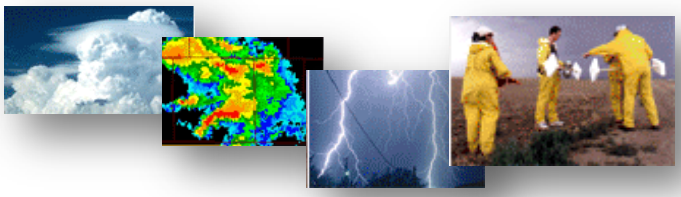
National Severe Storms Laboratory

On the leading edge of severe weather science

What Does the National Severe Storms Laboratory Do for the Nation?



The National Severe Storms Laboratory (NSSL) serves the Nation with leading edge research in radar, forecasting, and hydrometeorology to help forecasters produce the best severe weather forecasts and warnings possible. Its mission is to observe, understand, and predict severe weather in ways that will assist National Weather Service (NWS) forecasters and Federal, university, and private sector partners save lives and reduce property damage.

Recent Accomplishments and Next Steps

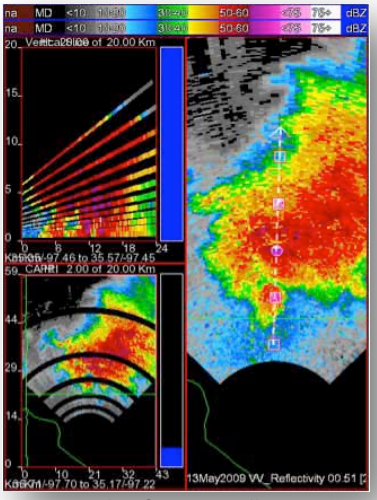
Radar improvements: *Radar is one of the most valuable tools available to a forecaster. NSSL is a world leader in developing weather radar technology to improve observations, predictions, and warnings of high-impact weather including tornadoes, severe thunderstorms, and flash floods.*

Benefit: Improved quality of severe weather warnings.

The **National Weather Radar Testbed (NWRT)** Phased Array Radar (PAR) is located in Norman, Oklahoma. NSSL is responding to the NWS need for efficient and effective scanning with the **A**daptive **D**igital Signal Processing **A**lgorithm for **P**AR **T**imely **S**cans (ADAPTS). The ADAPTS algorithm electronically directs the PAR to sample storms and storm features of interest at low elevations more frequently where rapidly developing hazardous weather can pose a threat to life and property.

Benefits: More accurate precipitation forecasts and improved public safety.

NSSL is working on an algorithm to use **dual-polarized Doppler radar** data combined with surface temperature sensors and numerical weather prediction data, to produce a surface precipitation type product. This will accurately depict regions of freezing rain, snow, and rain at the surface, making estimates of precipitation amounts more accurate, and aiding aviation and transportation operations.



An example of a supercell scan strategy directed by the ADAPTS algorithm. Photo: NOAA

Forecast and warning improvements*: NSSL researchers use modeling, direct observation through field studies, and past weather data to improve the accuracy and amount of lead-time of forecasts and warnings issued by the National Weather Service (NWS).*

Benefits: Results will help improve tornado forecasts and warnings.

NSSL is midway through the data collection phase of the largest-ever field program to study tornadoes: VORTEX-2 (**V**erification of the **O**rigins of **R**otation in **T**ornadoes **E**xperiment-2). The NOAA and National Science Foundation sponsored project focuses on measuring and documenting all parts of a supercell thunderstorm to gain new insight about how, when, and why tornadoes form.

NSSL's Field Command vehicle helped coordinate VORTEX2 operations in the field. Photo: NOAA

Benefits: Improved efficiency and accuracy of severe weather forecasts and warnings will save lives and reduce property damage.

Scientists from NSSL co-sponsor the annual **NOAA Hazardous Weather Testbed (HWT**) Spring Experiment with forecasters from the NWS Storm Prediction Center to focus on early and precise forecasts and warnings of severe weather hazards. Visiting forecasters evaluate new forecast and warning products, techniques and technologies, while researchers can be immersed in the challenges, needs, and constraints of front-line forecasters.

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More Accomplishments

Benefit: Tools designed to help forecasters handle the vast amounts of available data will improve the lead time and accuracy of forecasts and warnings.

NSSL leads the effort to change the severe weather warning paradigm from "warn on detection" to "**warn on forecast**." Researchers work to combine high resolution forecast models with high resolution real time data from radar and other sensors to provide forecasters with new guidance tools offering detailed information on the type, severity, and probability of the weather threat before the threat is ever detected.

Hydrometeorology improvements: *NSSL works to develop and improve weather and water related applications using radar and multi-sensor technology to monitor and predict flash floods to benefit the public and our economy.*

Benefit: · Improved precipitation estimates, flash flood forecasts and warnings.

NSSL's prototype quantitative precipitation estimation product, Q2, combines the most effective multi-sensor techniques to estimate precipitation. Q2 products have been used in various meteorological, aviation, and hydrological applications, and Q2 technology is beginning its transition to NWS operations.

Benefit: Reduced number of fatalities due to flash floods, the leading cause of storm-related deaths.

NSSL leads the collaborative **CI-FLOW (Coastal and Inland-FLooding Observation and Warning)** project in North Carolina. CI-FLOW combines existing monitoring technology and new techniques to forecast and warn of coastal storm effects such as heavy rainfall, storm surge, and subsequent river conditions.

NSSL's quantitative precipitation estimation product, Q2. Image: NOAA

Did You Know?

During VORTEX-2 2009 operations, NSSL researchers were part of a team of about 200 tornado experts and support staff. On June 5, 2009 they successfully deployed ten mobile radars and dozens more instrumented vehicles around and under a supercell thunderstorm that produced a tornado in southeast Wyoming, collecting unprecedented data.

Research Partners

NSSL has a research partnership with the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), a cooperative institute between NOAA and the University of Oklahoma. Additionally, NSSL conducts collaborative research with the NWS, other NOAA laboratories, the Navy, Air Force, Army, Department of Transportation, Federal Aviation Administration, Texas A&M University, Texas Tech University, and several corporations.

Budget and Staff

The fiscal year 2010 enacted budget for the NSSL is $17.7 M. The fiscal year 2011 President' budget request for NSSL is $23.7M. The fiscal year 2010 President's budget request for NSSL was $13.7M. NSSL currently has 49 full time equivalent employees. NSSL is located in Norman, Oklahoma.

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